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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VINH, LAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 03/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,452

Applicant(s)

HONGO ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/572432.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 71703.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh (US 6,056,869) in view of Chen (US 5,723,387)

Uzoh discloses a method for electrochemically deplating metal from side edges of a semiconductor wafer. The method comprises the steps of:

depositing/plating a metal film onto a surface of seed layer of a substrate (col 4, lines 4-6)

in a shaped cathode/cleaning section, ejecting an etching solution onto the side edge/peripheral portion of the metal film for removing side edge portion of the metal film while holding and rotating the wafer/substrate (col 7, lines 62-65; col 8, lines 49-56). Fig. 3a of Uzoh shows the metal film plated facing upwardly

Art Unit: 1765

Unlike the instant claimed inventions as per claims 1, 6, Uzoh fails to specifically disclose plating the metal film in a plating section/plating vessel

Chen discloses a method for forming copper interconnection comprises the step of plating the metal film in a plating section/plating vessel (col 5, lines 23-25)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Uzoh by plating the metal film in a plating section/plating vessel as per Chen because according to Chen plating the metal film in a plating section provides a thick layer of Cu in a less stringent clean environment (col 6, lines 65-67)

Regarding claim 2, Uzoh discloses directing the electrolyte/cleaning onto a backside of the wafer/substrate for removing metal adhered to the backside (col 8, lines 54-56; fig. 3b)

Regarding claim 3, fig. 3a of Uzoh shows that the electrolyte/ cleaning solution is supplied onto a central portion of the substrate for removing metal from the substrate

Regarding claim 4, Uzoh discloses that one or more electrolytes/cleaning solution and/or etchant may be directed onto the side edge and central portion of the substrate having the metal film (col 6, lines 12-21; fig. 3a)

Regarding claim 5, Uzoh discloses that the unwanted metal on the backside is entirely removed by the electrolyte/cleaning solution (col 8, lines 49-56)

Regarding claims 7-8, Uzoh discloses using a nozzle inclined to a surface of the metal film to eject the electrolyte onto the side edge of the metal film (col 8, lines 14-16, fig. 3b shows the nozzle is spaced a distance from the edge of the substrate

Art Unit: 1765

Regarding claim 9, Uzoh discloses using sulfuric acid in the electrolyte/etchant solution (col 6, lines 23-25)

Regarding claim 10, Uzoh discloses forming Cu film on the substrate (col 4, lines 1-2)

Regarding claim 11, Uzoh discloses flowing DI water through conduit 35 onto the surface of the substrate (col 5, lines 55-65), which reads on washing the metal film plated on the substrate before ejecting the etching solution onto the peripheral of the metal film

Unlike the instant claimed inventions as per claim 12, Uzoh fails to specifically disclose rinsing and drying the substrate after ejecting the etching solution onto the substrate

Chen also discloses rinsing and drying the substrate after cleaning the substrate with an etching solution (col 3, lines 50-57)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Uzoh by adding the step of rinsing and drying the substrate after ejecting the etching solution onto the substrate to prepare the substrate for re-introduction into the very clean environment as taught by Chen (col 3, lines 56-58)

Unlike the instant claimed inventions as per claim 13, Uzoh fails to specifically disclose transporting the substrate from the plating section to the cleaning section

Chen also discloses transporting the substrate from the plating section to the cleaning section using automated indexing apparatus (col 5, lines 17-20)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Uzoh method by adding the step of transporting the substrate from the plating section to the cleaning section using indexing apparatus for withdrawal of

Art Unit: 1765

substrate from the chamber for further processing in associated semiconductor manufacturing apparatus that require high clean room environment as taught by Chen (col 6, lines 20-27)

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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March 1, 2005